

## **Department of Microbiology and Immunology Assessment Plan**

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### Degrees/Majors/Options Offered by the Department

BS – Microbiology

    General Microbiology Option (Includes Pre-Med)

    Environmental Health Option

    Medical Lab Sciences Option

    Biotechnology (Microbial Systems Options)

MS – Microbiology

PhD – Microbiology

## **Assessment Plan**

### **Degree Objectives for the Microbiology Major**

Microbiology is a diverse discipline with strong basic and applied aspects. Its basic aspects are concerned with understanding the life processes exhibited by microorganisms and with understanding how microbes evolved to carry out these processes. The basic aspects are also concerned with the interaction of microbes with other organisms, both microorganisms and macroorganisms, and with how these interactions impact the ecosystems where microbes are found and how pathogenic microorganisms interact with the immune system of the host. The applied aspects of microbiology include medical microbiology, environmental microbiology, and industrial microbiology/biotechnology. All three applied aspects involve controlling the activities of microbes for the purpose of improving the human condition.

Professional microbiologists are found in academic, private, and governmental institutions working as scientists and/or as educators. Some enter the profession with the baccalaureate degree, working as clinical laboratory scientists, technicians, and sanitarians. Others enter after obtaining further training in graduate or professional schools. In addition, an undergraduate degree in microbiology provides an excellent foundation for those interested in becoming physicians, dentists, employees of firms providing support services or products to professional microbiologists, and consultants or advisors to businesses and governmental agencies.

There are four options within the microbiology major (General Microbiology, Medical Laboratory Science, Environmental Health and Biotechnology – Microbial Systems); all provide the experiences and knowledge needed for most of the career options described above. It is our aim to enable students to succeed in their chosen career path by supporting them in the following ways:

- Providing information and guidance regarding career opportunities in microbiology and related professions.
- Providing broad coverage of the discipline.
- Providing experiences that enable students to reach the Learning Outcomes as specified below.

## **Department of Microbiology and Immunology Assessment Plan**

An assessment plan has been prepared which is in accordance with the Degree Objectives for the Microbiology Major. The Assessment Plan consists of:

- 1). Establishment of Learning Objectives and identification of courses that satisfy the Learning Outcomes,
- 2). A method of assessment of these Learning Objectives,
- 3). A plan for implementation of this assessment
- 4). Data collection and Analysis.

The details of each of these components of the Assessment Plan are given below.

### **1. Learning Objectives (= Competencies)**

Learning Outcomes have been defined and courses that satisfy each of these learning outcomes have been identified as listed below in Sections A and B respectively.

#### **A). Learning Outcomes:**

**Learning Objective 1:** Define, describe and use the fundamental terms and concepts of modern microbiology as evidenced by the ability to present, discuss and answer questions about a scientific article in the field of microbiology.

**Learning Objective 2:** Design an experiment to test a hypothesis or fundamental concept in microbiology

**Learning Objective 3:** Perform basic microbiological lab techniques

**Learning Objective 4:** Access and analyze bioinformatics data

**Learning Objective 5:** Verbally communicate about fundamental and modern microbiological concepts.

**Learning Objective 6:** Communicate in a written form about fundamental and modern microbiological concepts

#### **B). Courses<sup>1</sup> which satisfy the identified Learning Outcomes:**

**Learning Outcome 1:** BIOM 360; BIOM 494

**Learning Outcome 2:** BIOM 455

**Learning Outcome 3:** BIOM 360; BIOM 432

**Learning Outcome 4:** BIOM 450; BIOB 428

**Learning Outcome 5:** BIOM 494; BIOM 450; BIOM 497

**Learning Outcome 6:** BIOM 450; BIOH 405; BIOM 435, BIOB 410

<sup>1</sup>Course Titles corresponding to Course numbers:

BIOM 360 – General Microbiology

BIOH 405 – Hematology

BIOB 410 – Immunology

BIOM 410 – Microbial Genetics

BIOB 428 – Molecular Evolution

BIOM 432 – Medical Bacteriology Lab

BIOM 435 – Virology

BIOM 450- Microbial Physiology

BIOM 455 – Research Methods in Microbiology

BIOM 494 – Seminar, Capstone

BIOM 497 – Educational Methods (Teaching)

## 2. Method of Assessment

A form has been created for each course to be assessed and for each Learning Objective. An example of an Assessment form is given below. On this assessment form, the Learning Objective is given along with a scoring rubric to assess performance level of the Learning Objective. A threshold has been defined, such that if student performance falls below this threshold, some faculty action will be taken to improve the program. We intend to have members from the Department, as well as faculty from other Departments where appropriate, participate in these Assessments.

### Microbiology Assessment Form Scoring Rubric

Course: BIOM 360 (General Microbiology) Semester \_\_\_\_\_

Evaluator: \_\_\_\_\_

Dept. of Evaluator \_\_\_\_\_

**Type of Learning Activities(s) Assessed:** choose one of the following:

*Written examination*

*Written assignment*

*In class activities (role play, class discussion, presentations)*

*Performance of Lab Procedure*

*Out of class activities (projects)*

*Other (please specify)*

**Learning Objective Assessed:**

**1. Use of knowledge of the fundamental terms & concepts of microbiology**

Student should be able to:	Performance Level				
a. show they have <u>acquired</u> a foundational knowledge of microbiology	1	2	3	4	5
b. show they <u>can use</u> foundational knowledge about microbiology and are able to organize and summarize this information	1	2	3	4	5
c. show they can <u>apply</u> foundational knowledge in microbiology when challenged with new situations by asking intelligent questions that lead to an understanding of the new situation	1	2	3	4	5
d. show they can <u>synthesize</u> from the answers to those questions new knowledge about microbiology	1	2	3	4	5

1 = Not Done

\*2 = **Performed but with poor execution – threshold level (see note below)**

3 = Adequate Performance; Met Expectations

4 = Performance Well Executed; Exceeds Expectation

5 = Performance Excellent; Exceeds Expectations Plus

❖ **threshold level:** if student performance falls below this threshold faculty action will be taken to improve the program.

### 3. Implementation of Assessment of Learning Outcomes: Assessment Schedules from 2011-2015 and 2015-2018:

#### Program: Microbiology – General Microbiology Option

Learning Outcomes	Assessment Year				Target course(s) for Assessment Data <sup>1</sup>
	2011-12	2012-13	2013-14	2014-15	
1. Use knowledge of the fundamental terms & concepts of microbiology	x				BIOM 494(F/S)
2. Design an experiment to test a hypothesis or microbiological concept		x			BIOM 455(S)
3. Perform basic microbiological lab techniques		x	x		BIOM 360(F/S) BIOM 432(S)
4. Access & analyze bioinformatic data or large datasets	x	x			BIOM 450 (F)
5. Verbally communicate about fundamental and modern microbiological concepts			x x	x	BIOM 450(F) BIOM 494 (F/S) BIOM 497 (F)
6. Communicate in written form about fundamental & modern microbiological concepts	x	x	x	x	BIOH 405 (F) BIOB 410 (F) BIOM 435(F) BIOM 450 (F)

<sup>1</sup>- courses designated as offered in the Fall Semester (F), Spring Semester (S) or Fall and Spring (F/S) semesters.

MBI Dept. Assessment Schedule 2015-18

#### Assessment Schedule: 2015-2018

Year	LO	Course	Assessor 1	Assessor 2	Course Instructor(s)
2015/16	1	BIOM 360 (S)			
	2	BIOM 455(S)	<b>Halonen</b>		
	3	BIOM 441 (S)	<b>Franklin</b>	<b>Hudson</b>	
2016/17	3	BIOM 360 (F)	<b>Grad. TA</b>	<b>Boyd</b>	<b>Boyd, Walk, Rasmussen</b>
		BIOM 432 (S)	<b>Rasmussen</b>	<b>Craver</b>	<b>Craver</b>
2017/18	4	BIOM 450 (F)			<b>Fields</b>
	5	BIOM 450 (F)			
		BIOM 494 (S)			
	6	BIOH 405 (F)			
		BIOB 410 (F)			
		BIOM 435 (F)			

F = Fall semester; S = Spring semester

#### Learning Objectives (LO)

Our students should be able to:

1. Use knowledge of the fundamental terms and concepts of microbiology
2. Design an experiment to test a hypothesis or microbiological concept
3. Perform basic microbiological lab techniques
4. Access and analyze bioinformatic data or large datasets
5. Verbally communicate about fundamental and modern microbiological concepts
6. Communicate in written form about fundamental and modern microbiological concepts

**4. Data, Collection, Analysis and Use:**

Assessments were begun in the Spring 2012. Assessment data will be collated and analyzed at the end of the academic year. The Undergraduate Curriculum Committee will analyze the results of the assessment and prepare an Assessment Report that will be given to the Department Head and the Provosts Office. The Assessment results will be shared with the full Department during the Departmental Annual Retreat.